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from theory, life so different from philosophy and science, that the latter may and should have its own rights in its own sphere without any dictation from practical life. (*Query*: Had Professor Schinz got hold by mistake of a book by one of Professor James's colleagues?) These second thoughts regarding Professor James may be compared with the earlier chapter in which it is shown that Professor James "exactly reflects" the popular tendencies about him. It would be interesting to see Professor Schinz apply his favorite disjunctive dilemma to his own case.

If the reader wonders why so much space has been devoted to a book of which the foregoing is a synopsis as exact as limits of space permit, I may remind him that the book appears in Alcan's "Library of Contemporary Philosophy"; and, coming from a teacher in a representative American college, can hardly fail in France at least of a certain prestige and authority, as presumably diagnostic of American life and thought.

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Essays on Evolution: 1889-1907. By EDWARD BAGNALL POULTON.
Oxford, At the Clarendon Press, 1908. — pp. xlviii, 479.

This volume is made up of ten papers and addresses, of various date and occasion; but all, as Professor Poulton remarks, "are the expression of a continuous line of thought," and all have been revised, so that their "arguments and conclusions . . . represent" his "views at the present moment."

An introduction, entitled "Mutation, Mendelism, and Natural Selection," subjects the manners of the English 'Batesonians,' as well as their theories, to a severe but not unjustified criticism. Mendel's discovery, says Professor Poulton, is "a fascinating and interesting addition to knowledge." But as yet the extent of its application is doubtful; and it is in any case probable that its part in evolution "is limited to the prevention in certain cases of the supposed 'swamping effect of intercrossing.'" Professor Bateson and his school have greatly exaggerated its importance; and their contemptuous depreciation of investigations in the geographical distribution of species, in embryology, and in the various questions connected with adaptation, if it prevailed, would have a most baleful effect upon biological studies in general.

In the first of the ten essays, "A Naturalist's Contribution to the Discussion upon the Age of the Earth," the principal methods of calculation proposed by the physicists are briefly stated, and criticised as involving an excessive simplification of the actual conditions. The mean result of the geologists' calculations, about 450,000,000 years, is accepted as the period required for the formation of the stratified rocks. The naturalist's contribution consists in establishing, by a brief review of the paleontological record, and its comparison with living forms, that only a brief portion of the development of even the great higher phyla took place within this period. All the evi-

dence goes to show that the earlier forms in any series are developed and modified much more slowly than the more advanced. The general conclusion is therefore that for the history of these phyla the 450,000,000 years must be multiplied several times; and for the development of the original ancestral forms "the period thus obtained requires to be again increased and perhaps doubled." The general reader will find this essay especially useful, as it summarizes compactly a heated discussion of long standing, and a mass of evidence both old and new.

The second essay deals with the question, "What is a Species?" Professor Poulton defends the interesting conclusion that unlike all the other divisions employed in biological classification, species, like individuals, have objective reality. They are, he holds, groups characterized by the two marks of free interbreeding and common descent, for which the terms *syngamy* and *synepigony* are proposed. Common characters are but the consequences of these two causes; and so also is interspecific sterility "an incidental consequence of asyngamy." It is also suggested that "the injurious effects of self-fertilisation" are "the consequence and not the cause of the adaptations for cross-fertilisation," since these result in partial or complete asyngamy, and consequently in a partial sterility.

The following three essays, "Theories of Evolution," "Theories of Heredity," and "The Bearing of the Study of Insects upon the Question 'Are Acquired Characters Hereditary?'" are devoted to the presentation of the case for Neo-Darwinism against Lamarckism. The details of the discussion must be passed over. Professor Poulton is an able advocate, and, as might be expected, the evidence he draws from entomology is especially fresh and interesting. Elsewhere he is perhaps more effective in criticism than in defence; but this is probably true of the champions of both parties. It is interesting to notice that the two brief paragraphs at page 108, replying to the objection that a variation must have life-and-death value before it can be 'selected,' have apparently remained unamplified and unaltered since their original delivery in 1894. The gist of their answer is that "organs are not formed anew in an animal, but they are formed by the modification of pre-existing organs." How far this is from answering the question as to the origin of such modifications and their cumulation to the selective level is obvious; but this is the only passage in which Professor Poulton discusses this cardinal difficulty in the Neo-Darwinian theory. Nor is there any mention, either here or elsewhere, of Weismann's attempt to meet this difficulty by his theory of Germinal Selection. It may be remarked in passing that the statement that "Lamarck believed in an innate tendency toward perfection in animals" is truer to Darwin's idea of Lamarck than to Lamarck himself.

"A Remarkable Anticipation of Modern Views on Evolution" is narrated in the sixth essay. It is that of James Cowles Prichard, famous for his work in anthropology. He is shown to have stated very clearly, as early as 1826, the precise distinction between congenital and acquired characters,

and to have held that only the former were hereditary. He also had a vague idea of Natural Selection, and a very clear one of Artificial Selection. But, like Buffon, he wavered later, and gave up his original insights.

The first part of the seventh essay discusses the attitude of Huxley towards the theory of Natural Selection. Its second part, and the three remaining essays of the book, are devoted to an extended discussion of mimicry and Müllerian resemblance in all their aspects, for the most part, naturally, as found in insects, where the phenomena in question are most conspicuous. The tenth essay, in spite of the limitation of its title ("The Place of Mimicry in a Scheme of Defensive Coloration"), is really a brief monograph on all the various modifications, for the purposes of defence or offence, of form, color, movement, and attitude, and sums up the results of a great deal of the recent work in this field. A classified list of examples of mimicry is appended.

Although this is the most technical portion of the book, it is not the least interesting. Professor Poulton is here especially concerned to establish two conclusions: that Natural Selection is the only adequate explanation for the phenomena of mimicry in its wide sense; and that 'true' or 'Batesian' mimicry is very rare, while Müller's theory of "common warning colors" seems to explain the larger number of such cases of resemblance. Judgment as to the success of the argument for the second position must be left to the specialist. To the casual reader it seems very probably correct, but needing further experimental verification, especially in the matter of the relative unpalatability of various species of insects to their bird enemies. For the first conclusion Professor Poulton makes out a very strong case, which no adherent of the rival explanations can neglect. He points out that no other of the causes assigned,—direct effect of environment, internal laws of development, or Sexual Selection,—can account for *all* the cases of resemblance of animals to one another and to inanimate objects, without great improbability; Natural Selection can. The various cases of mimicry between animals are quite independent of affinity, and the resemblance is in all cases superficial save where more essential similarity assists in its production. Indeed, the methods of producing resemblance to the same model sometimes differ in the most surprising way, thus excluding both external and internal causes; while its appearance in immature individuals excludes Sexual Selection. Resemblance to inanimate objects can in no way be explained by internal causes; while any explanation by external causes presupposes the inheritance of acquired characters. Professor Poulton, however, obviously implies, in urging this last argument, that external causes can in no way affect the germ, and thus, as has already been mentioned, seems to adhere to a position which Weismann has now abandoned. The wealth of interesting examples with which the argument is illustrated, and the incidental references to topics, such as the education of birds, which have an independent interest of their own, can be merely mentioned here.

Professor Poulton's book is one that may be commended to the general reader as well as to his colleagues. His exposition is lucid, and his method truly philosophical, for everywhere he tries to see the part in the light of the whole. "There are always two questions," *why* and *how*, "to be answered with reference to any natural phenomenon," he remarks, "and both must be answered if the facts are to be fully understood." So the general discussions with which he begins are verified and illustrated by examples chosen from his especial field of research, and the detailed special investigations summed up in the concluding essays are all made to bear upon and be illuminated by his chosen principle of explanation. As long as Natural Selection has defenders of this quality, it may safely be prophesied that no mere 'school of facts,' Mutationist or other, will oust it from control. That can be accomplished only by a more adequate *theory*.

The book is beautifully printed, in a large bold open type, which is a delight to eyes wearied by attenuated stereotype. Its analytical index, eighty-four pages in length, deserves especial praise for its completeness and usability. May it serve as a model to other authors and publishers,—especially French and German! No topical table of contents, however full, can take the place of a good index. Still, had Professor Poulton prefixed such a table, his book might be regarded as mechanically perfect.

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The Psychological Phenomena of Christianity. By GEORGE BARTON CUTTEN. New York, Charles Scribner's Sons, 1908. — pp. xviii, 497.

In this recent book Dr. Cutten makes a notable contribution to the modern clergyman's library. There can be no doubt that "the psychological standpoint is not only important but indispensable for the religious worker, whether preacher or teacher," and it is certainly time that some competent person should work through the great mass of material which has been accumulating in recent years, and "essay a summation of the conclusions" reached by various workers in different parts of the field called "The Psychology of Religion." In the main Dr. Cutten has done this work thoroughly and well. His bibliography is extensive and comprehensive; his attitude is independent and fearless, and generally scholarly and scientific, though occasionally one feels that he allows the preacher to slip into the place of the scientist, that he has turned from an impartial statement of the facts to exhort the faithful and reassure the timid by brief declarations of his personal beliefs. However, this may be no objection to the book, in the minds of those for whom it is intended, — "the general reader, as well as the psychological and theological student."

In his first two chapters, Dr. Cutten gives a general introduction to his work: in the first chapter emphasizing the importance of the study of religion from the psychological point of view, since in the treatment of souls, diagnosis should precede and determine the remedies to be tried; and in